APPENDIX A

STATEMENT OF WORK

Remedial Investigation and Feasibility Study
& Identification of Early Response Action Areas

North Ridge Estates
Klamath County, Oregon

I. INTRODUCTION

The primary purpose of this Remedial Investigation/Feasibility Study ("RI/FS") is to investigate the nature and extent of asbestos contamination at the former Marine Recuperational Barracks, now North Ridge Estates (hereinafter "Site"), in order to assess the potential risk to human health and the environment, develop and evaluate potential remedial alternatives and to recommend a preferred alternative. The RI and FS are interactive and may be conducted concurrently so that the data collected in the RI influences the development of remedial alternatives in the FS, which in turn affects the data needs and the scope of treatability studies, if necessary.

This RI/FS will be conducted by the Respondents pursuant to a Unilateral Administrative Order (UAO) issued by the U.S. Environmental Protection Agency (EPA). Work conducted under this UAO is intended to satisfy the legal requirements for a remedial investigation established under both the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9601 *et seq*., and the Oregon Superfund law, ORS 465.200 *et seq*. As such, oversight of Respondents' work conducted under this UAO will be carried out and coordinated by EPA and the State of Oregon Department of Environmental Quality (DEQ) in a manner to assure the satisfaction of all federal and state requirements.

Respondents will produce RI and FS deliverables that are in accordance with the UAO, this Statement of Work (SOW), the *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (U.S. EPA, Office of Emergency and Remedial Response, Oct. 1988), and any other guidance that EPA uses in conducting an RI/FS (a list of the primary guidance is attached). The RI/FS Guidance describes the report format and the required report content. The Respondents will furnish all necessary personnel, materials, and services needed, or incidental to, performing the RI/FS, except as otherwise specified in the UAO. Community relations components are the responsibility of EPA and DEQ, with input from the Respondents as appropriate and indicated in this SOW.

Health concerns in this residential area have related primarily to the presence of asbestos-containing material (ACM) from building debris. Previous efforts at the Site have removed more than 90 tons of surficial ACM, but further ACM remains at the Site along with the potential for other hazardous substances of concern from other sources such as historic landfills, transformers

(PCBs), and solvents from possible dry cleaning operations. The RI/FS will also address any concerns related to these potential contaminants of concern. At their option, the Respondents may propose early actions (response actions prior to a ROD), but neither the UAO nor this SOW require early actions unless otherwise agreed by the Parties in writing.

As specified in Section 104(a)(1) of CERCLA, as amended by SARA, EPA will provide oversight of the Respondents' activities throughout the RI/FS. The Respondents will support EPA's initiation and conduct of activities related to the implementation of oversight activities and will coordinate with EPA on all SOW activities.

II. RI/FS ACTIVITIES

The following activities shall be performed by Respondents:

TASK A. PROJECT MANAGEMENT

This task is intended to ensure that Respondents carefully manage all aspects of the work required herein and report to EPA in a timely and consistent manner. This work shall include, but not be limited to, preparing a Project Management Plan that will include specific protocols and requirements for the following:

1. A project schedule (including Task B, Subtasks a-h, field work, analytical work, deliverables due dates, etc.), to be revised as necessary with EPA's approval;

2. A distribution list for deliverables (to oversight contractor, EPA, DEQ, and others to be specifically defined in the Final Project Management Plan);

3. A list of selected subcontractors, including laboratories, drillers, disposal contractors, and risk assessors that will be identified and contracted by Respondents' RI/FS contractor;

4. Data management procedures to ensure coordination with other site activities including: (1) providing EPA with analytical data within five working days of completing the Quality Assurance/Quality Control ("QA/QC") review of the analytical results and that meet the requirements of the Data Quality Objectives ("DQO") defined for the project, in an electronic format (as specified by EPA, agreed to by Respondents, and defined in the RI/FS Work Plan); (2) use of compatible and transferable geographic information systems locators; and (3) other data management procedures to be specifically defined in the Project Management Plan;

5. Schedule and format for monthly progress reports (including project status, work completed, schedule compliance, issues of concern, work to be performed, and other information to be specifically defined in the Project Management Plan); and

6. Schedule and agendas for project meetings that may be necessary.

Project Management Deliverables:

Major Deliverables:

a. Project Management Plan
b. Project Schedule

Interim Deliverables:

a. Monthly Reports
b. Meeting Schedules and Agendas
c. Meeting Minutes (including agreements made and "to-do" lists)

Previously collected data at the Site relevant to work to be performed by Respondents may be included in work product to be produced by Respondents for the RI/FS.

TASK B. RI/FS PROJECT PLANNING AND SCOPING

Scoping is the initial planning process of the RI/FS and will be initiated by EPA and Respondents as soon as possible. During the scoping process, the site-specific objectives of the RI/FS will be determined by EPA in consultation with DEQ and Respondents. In addition to developing the site-specific objectives of the RI/FS, EPA and Respondents will define a general project management approach for the Site, documented by the Respondents in a RI/FS Work Plan. Because the work required to perform an RI/FS is not fully known at the onset, and is phased in accordance with a Site's complexity and the amount of available information, it may be necessary to modify the work plan during the RI/FS to satisfy the objectives of the study. When scoping the specific aspects of this project, Respondents shall meet with EPA to discuss all project planning decisions and special concerns associated with the Site.

The objectives for the Site have been determined preliminarily, based on available information, to be the following:

1. Protection of human health: elimination of unacceptable cancer and non-cancer impacts from exposure to asbestos in soil as a result of dermal exposure and incidental ingestion through residential and construction activities, and respiratory exposure through inhalation during residential and construction activities;

2. Determine the risks posed to residents at NRE using information collected to date. Collect additional data to fill data gaps identified in the previous investigations to support this work as needed;

3. Eliminate any ongoing or potential source(s) of other Contaminants of Potential Concern (COPC) identified at the Site; and

4. Eliminate exposure to any site-related contaminated media.

The specific tasks for RI/FS scoping and planning will consist of the following:

1. Subtask a: Site Background

2. Subtask b: Final Screening Risk Assessment

3. Subtask c: Preliminary Conceptual Site Model

4. Subtask d: Remedial Action Objectives and Alternatives

5. Subtask e: RI/FS Work Plan

6. Subtask f: Sampling and Analysis Plan

7. Subtask g: Health and Safety Plan

8. Subtask h: Identification and evaluation of potential early actions

Subtask a: Site Background

The Respondents will gather and analyze the existing Site background information, conduct a Site visit, and compile all collected information in a Site Background Report submitted to EPA to assist in planning the scope of the RI/FS.

Collect and analyze existing data and document the need for additional data

Before planning RI/FS activities, all existing Site data will be thoroughly compiled and reviewed by the Respondents. Specifically, this will include presently available data relating to the varieties and quantities of hazardous substances at the Site, and past disposal practices. This will also include results from any previous sampling events that may have been conducted at the Site and a description of previous responses that have been conducted at the Site by local, state, federal, or private parties. The Respondents will refer to Table 2-1 of the RI/FS Guidance for a comprehensive list of data collection information sources. This information will be utilized in determining additional data needed to characterize the Site, better define potential applicable or relevant and appropriate requirements (ARARs), and develop a range of preliminarily identified remedial alternatives. Data Quality Objectives (DQOs) will be established subject to EPA approval, which specify the usefulness of existing data. Decisions regarding the necessary data and DQOs will be made by EPA. Existing information and data will be utilized to help determine data gaps in Site characterization (including determination of background), identify

chemicals of potential concern, develop a preliminary Conceptual Site Model, preliminarily identify risks to human health and the environment, better define potential ARARs, and develop a range of preliminarily identified remedial alternatives. Respondents will also provide electronic and database files directly to EPA in a format compatible with EPA's computer systems to allow independent review and analysis of information and data.

Conduct Site Visit

The Respondents will conduct a site visit with EPA during the project scoping phase to assist in developing a conceptual understanding of sources and areas of contamination as well as potential exposure pathways and receptors at the Site. During the site visit the Respondents will observe the Site's physiography, hydrology, geology, and demographics, as well as natural resource, ecological, and cultural features. This information will be utilized to better scope the project and to determine the extent of additional data necessary to characterize the Site, better define potential ARARs, and narrow the range of preliminarily identified remedial alternatives.

Evaluate Cultural Resources

Respondents will evaluate cultural resources and cultural uses using a typical approach provided for under Section 106 of the National Historic Preservation Act (16 U.S.C. § 470). Respondents will coordinate cultural resource work with appropriate Tribes and resource Trustees to ensure that a full and comprehensive cultural resource analysis is done when characterizing Site use.

Subtask b: Final Screening Risk Assessment

At the start of the RI/FS, the Respondents will summarize the data collected during the removal action and prepare a Final Screening Risk Assessment that presents a comprehensive analysis of risk from asbestos exposures to residents at the Site. For example, air and soil samples have been collected, but risks associated with exposures to these media have not yet been addressed in a single, comprehensive risk assessment report. For community relations purposes, EPA will summarize the risk assessment findings into a report that can be distributed to residents at North Ridge Estates along with the original report prepared by Respondents as approved or accepted by EPA.

Subtask c: Preliminary Conceptual Site Model (CSM)

In consultation with EPA, Respondents shall develop and deliver for EPA's review and approval a Conceptual Site Model for North Ridge Estates. The preliminary CSM will portray the relationship among sources, chemicals, transport mechanisms, receptors, and other parameters that are determined to be relevant during implementation of the UAO. The CSM for the human health risk assessment (HHRA) will include potential exposure pathways.

Subtask d: Remedial action objectives and alternatives

Work conducted pursuant to the UAO will include development of Site-specific remedial action objectives (RAOs). These RAOs may be a combination of applicable federal and state ARARs, published guidelines, and/or risk-based cleanup levels. Respondents will participate in developing these RAOs.

In identifying Remedial Action Objectives, the following will be considered:

1. conclusions from the Final Screening Risk Assessment;

2. evaluation and analysis of information and data by DEQ, Oregon Department of Health, and the Agency for Toxic Substances and Disease Registry (ATSDR); and

3. all actions to be evaluated should consider current and reasonably foreseeable future land uses.

Once existing Site information has been analyzed and an understanding of the potential Site risks has been reached, the Respondents will review and, if necessary, refine the remedial action objectives that have been identified by EPA for each actually or potentially contaminated medium. The revised remedial action objectives will be documented in a technical memorandum and subject to EPA approval. The Respondents will then identify a preliminary range of broadly defined potential remedial action alternatives and associated technologies. The range of potential alternatives should encompass, where appropriate, alternatives in which treatment significantly reduces the toxicity, mobility, or volume of the waste; alternatives that involve containment with little or no treatment; and a no-action alternative. Respondents shall include excavation, capping, and other alternatives (as well as combinations of each where called for) in the range of alternatives, and will include this analysis in the RAO technical memorandum.

The memorandum will include a preliminary identification of potential state and federal ARARs (chemical-specific, location specific, and action specific), including state ARARs identified by DEQ in accordance with the NCP, to assist in the refinement of RAOs. Respondents will also identify other advisories, criteria, guidance, and other "to be considered" initiatives. Respondents will update ARAR identification in the technical memorandum during implementation of the UAO as Site boundaries, conditions, contaminants of concern, and RAOs become better defined.

Subtask e: RI/FS Work Plan

A work plan documenting the decisions and evaluations completed during the scoping process will be submitted to EPA for review and approval. The work plan should be developed in conjunction with the sampling and analysis plan and the Site health and safety plan, although each plan may be delivered under separate cover. The work plan will include a comprehensive description of the work to be performed, including the methodologies to be utilized, as well as a

corresponding schedule for completion. In addition, the work plan must include the rationale for performing the required activities. Specifically, the work plan will present a statement of the problem(s) and potential problem(s) posed by the Site and the objectives of the RI/FS. The plan will recognize Respondents' role in preparation of the baseline risk assessment. In addition, the plan will include a description of the Site management strategy developed by EPA during scoping; a preliminary identification of remedial alternatives and data needs for evaluation of remedial alternatives. The plan will reflect coordination with treatability study requirements. It will include a process for and manner of identifying federal and state ARARs (chemical-specific, location-specific, and action-specific).

Finally, the major part of the work plan is a detailed description of the tasks to be performed, information needed for each task and for Respondents' baseline risk assessment, information to be produced during and at the conclusion of each task, and a description of the work products that will be submitted to EPA. This includes the deliverables set forth in the remainder of this Statement of Work; a schedule for each of the required activities which is consistent with the RI/FS guidance; and a project management plan, including a data management plan (e.g., requirements for project management systems and software, minimum data requirements, data format and backup data management), monthly reports to EPA and meetings and presentations to EPA at the conclusion of each major phase of the RI/FS. The Respondents will refer to Appendix B of the RI/FS Guidance for a comprehensive description of the contents of the required work plan. Because of the interative nature of the RI/FS, additional data requirements and analyses may be identified throughout the process. The Respondents will submit a technical memorandum documenting the need for additional data, and identifying the DQOs whenever such requirements are identified. In any event, the Respondents are responsible for fulfilling additional data and analysis needs identified by EPA consistent with the general scope and objectives of this RI/FS.

EPA expects that the RI/FS Work Plan and any subsequent work plan addenda will incorporate problem formulations that articulate what technical decisions need to be made, and then define the information and data needs required to make those decisions. Respondents will use the DQOs planning process, and other relevant EPA guidance in conducting the RI/FS, to develop sampling designs for information and data collection activities that support problem formulation and decision-making. Other than in the initial RI/FS Work Plan, Respondents will propose in all subsequent work plan revisions whether additional information and data are needed and, if so, the design of each information and data collection effort. Respondents may also propose a decision framework that can be applied to the information generated during each data collection effort. This decision framework may aid EPA in determining whether additional data will be required. Respondents will develop an RI/FS Work Plan and risk assessment approach that carefully and efficiently addresses these goals in the selection of appropriate remedial actions. During scoping for the RI/FS Work Plan and for the risk assessment approach, Respondents will meet with EPA regularly to discuss all appropriate project planning decisions and special concerns associated with the Site.

Subtask f: Sampling and Analysis Plan

The Respondents will prepare a sampling and analysis plan (SAP) to ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and that the data meet DQOs. The SAP provides a mechanism for planning field activities and consists of a field sampling plan (FSP) and a quality assurance project plan (QAPP).

The FSP will define in detail the sampling and data-gathering methods that will be used on the project. It will include sampling objectives, sample location and frequency, sampling equipment and procedures, and sample handling and analysis, and will require advanced notice to residents no less than 48 hours before access to their property is required, unless otherwise agreed by the resident. The QAPP will describe the project objectives and organization, functional activities, and quality assurance and quality control (QA/QC) protocols that will be used to achieve the desired DQOs. The DQOs will, at a minimum, reflect use of analytic methods to identify contamination and remediate contamination consistent with the levels for remedial action objectives identified in the proposed National Oil and Hazardous Substances Pollution Contingency Plan (NCP), pages 51425-26 and 51433 (December 21, 1988). In addition, the QAPP will address sampling procedures, sample custody, analytical procedures, and data reduction, validation, reporting, and personnel qualifications. Field personnel should be available for EPA QA/QC training and orientation where applicable. The Respondents will demonstrate, in advance and to EPA's satisfaction, that each laboratory it may use is qualified to conduct the proposed work. This includes use of methods and analytical protocols for the chemicals of concern in the media of interest within detection and quantification limits consistent with both QA/QC procedures and DQOs approved in the QAPP for the Site by EPA. The laboratory must have and follow an approved QA program. For asbestos, the laboratory must be a currently approved laboratory under the National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NAVLAP). The laboratory must also have documented results of a recent (within the last three years) on-site audit performed under the direction of EPA. The laboratory must provide the audit report and documentation of any appropriate corrective action taken as a result of the audit to EPA upon request for review. Upon review of the audit report and supporting documentation, the Agency shall have the right to allow or not allow use of the laboratory for asbestos analytical services.

For chemicals other than asbestos, if a laboratory not in the Contract Laboratory Program (CLP) is selected, methods consistent with CLP methods that would be used at this Site for the purposes proposed and QA/QC procedures approved by EPA will be used. If the laboratory is not in the CLP program, a laboratory QA program must be submitted for EPA review and approval. EPA may require that the Respondents submit detailed information to demonstrate that the laboratory is qualified to conduct the work, including information on personnel qualifications, equipment, and material specifications. The Respondents will provide assurances that EPA has access to laboratory personnel, equipment, and records for sample, collection, transportation, and analysis.

Subtask g: Site Health and Safety Plan

A health and safety plan will be prepared in conformance with the Respondents' health and safety program, and in compliance with OSHA regulations and protocols. The health and safety plan will include the eleven elements described in the RI/FS Guidance, such as a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and Site control. It should be noted that EPA does not "approve" the Respondents' health and safety plan, but rather EPA reviews it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment.

Subtask h: Identification and evaluation of potential early actions

Early actions for purposes of the UAO are response activities other than RI/FS activities performed before a ROD is issued by EPA. The Parties acknowledge and agree that, notwithstanding the requirements and deadlines otherwise stated in the UAO and this SOW, the Respondents may propose tasks to be performed in early action SOWs and that such tasks, if approved by EPA, will be performed in accordance with the schedule and technical standards outlined in the approved early action SOW. Following completion of any work in an approved early action SOW, Respondents will evaluate the findings and conclusions from completion of that work and submit a technical memorandum to EPA identifying criteria to be applied in selecting additional candidate early action areas, and, if applicable, identifying modifications to the SAP and FSP that should be made based on the experience derived from performance of work under early action SOWs.

Respondents' initial identification of additional potential early action areas will be based on existing information and data available at the time the technical memorandum is prepared following completion of any early action SOW. However, Respondents may elect or EPA may require Respondents to update the technical memorandum and/or make further early action candidate evaluations with information and data obtained during implementation of the RI/FS.

EPA intends that early action areas identified by Respondents in the technical memorandum will focus primarily on soil early actions, though early actions involving other environmental media may be considered. Any studies, investigations, or response actions regarding any early action will be developed and conducted consistent with the NCP and in parallel with other activities conducted within the scope of this UAO.

EPA may pursue early actions in any area of the Site if potential imminent and substantial endangerment conditions are determined by EPA to be present at the Site, and the Respondents are either unwilling or unable to conduct the necessary response actions in a timely fashion to address the potential imminent and substantial endangerment. If the Respondents are able and willing to conduct the necessary response action in a timely fashion, it will be conducted by Respondents outside the scope of this UAO under EPA oversight.

TASK C. COMMUNITY RELATIONS

EPA is responsible for the development and implementation of community relations activities at the Site. Respondents may be requested to assist with activities such as providing information, developing a mailing list, participating in public meetings, and establishing a community information repository at or near the Site. Upon request by EPA, Respondents shall make limited funding available to a qualified community group as provided in the UAO. Respondents shall ensure that the funding for a qualified community group is allocated to cover the entire RI/FS and other Work under the UAO, including review of the Proposed Plan. Consistent with 40 CFR 35.4090 (Waivers), Respondents may supplement the community group funding as Respondents consider appropriate. Public notice and opportunity for public comment and other participation during the RI/FS will meet NCP requirements. In addition, following initial EPA review, drafts of major documents listed in Paragraph 68(a)(1) of the Order, including the RI/FS Work Plan, Baseline Risk Assessment, Remedial Investigation report, and Feasibility Study report, will be made available for public review and comment before approval by EPA.

TASK D. SITE CHARACTERIZATION

As part of the RI, the Respondents will perform the activities described in this task, including the preparation of a Site Characterization summary and an RI report. The overall objective of Site characterization is to describe areas of the Site that may pose a threat to human health or the environment. This is accomplished by first determining the Site's physiography, geology, and hydrology. Surface and subsurface pathways of migration will be defined. The Respondents will identify the sources of contamination and define the nature, extent, and volume of the sources of contamination, including their physical and chemical constituents as well as their concentrations at incremental locations to background in the affected media. The Respondents will also investigate the extent of migration of this contamination as well as its volume and any changes in its physical or chemical characteristics, to provide for a comprehensive understanding of the nature and extent of contamination at the Site. Using this information, contaminant fate and transport is then determined and projected.

During this phase of the RI/FS, the Work Plan, SAP, and health and safety plan are implemented. Field data are collected and analyzed to provide the information required to accomplish the objectives of the study. The Respondents will notify EPA at least two weeks in advance of the field work regarding the planned dates for field activities, including ecological field surveys, field layout of the sampling grid, excavation, installation of wells, initiating sampling, installation, and calibration of equipment, and initiation of analysis and other field investigation activities. The Respondents will demonstrate that the laboratory and type of laboratory analyses that will be utilized during Site characterization meets the specific QA/QC requirements and the DQOs of the Site investigation as specified in the SAP. In view of the unknown Site conditions, activities are often iterative, and to satisfy the objectives of the RI/FS it may be necessary for the Respondents to supplement the work specified in the initial work plan. In addition to the deliverables below, the Respondents will provide a monthly progress report and participate in meetings at major points in the RI/FS.

a. Develop Preliminary Remediation Goals (PRGs)

To support RI/FS activities, Respondents will develop PRGs. Respondents will meet with EPA technical representatives prior to initiating this task. The objective of these meetings will be to discuss application of EPA guidance. Development of PRGs for applicable contaminants will include the following:

1. nationally-developed and/or regionally developed numerical guidelines;

2. pertinent studies and appropriate approaches to determine acceptable exposures;

3. protection of human health assuming exposure through direct contact, inhalation and ingestion with environmental media and secondarily contaminated media as a result of residential exposure, construction activities, recreational activities, and other activities in which such contact may occur; and

4. spread of contaminants through transport by air or water to other areas where humans can become exposed to it.

b. Field Investigation

The field investigation includes the gathering of data to define site physical and biological characteristics, sources of contamination, and the nature and extent of contamination at the Site. These activities will be performed by the Respondents in accordance with the Work Plan and SAP. At a minimum, this shall address the following:

Implement and document field support activities

The Respondents will initiate field support activities following approval of the Work Plan and SAP. Field support activities may include obtaining access to the Site, scheduling, and procuring equipment, office space, laboratory services, and/or contractors. The Respondents will notify EPA at least two weeks prior to initiating field support activities so that EPA may adequately schedule oversight tasks. The Respondents will also notify EPA, in writing, upon completion of field support activities.

Investigate and define site physical and biological characteristics

The Respondents will collect data on the physical and biological characteristics of the Site and its surrounding areas, including the physiography, geology, and hydrology, and specific physical characteristics identified in the Work Plan. This information will be ascertained through a combination of physical measurements, observations, and sampling efforts, and will be utilized to define potential transport pathways and human and ecological receptor populations. In defining the Site's physical characteristics the Respondents will also obtain sufficient engineering data (such as soil characteristics) for

the projection of contaminant fate and transport, and development and screening of remedial action alternatives, including information to assess treatment technologies.

Define sources of contamination

The Respondents will locate each source of contamination and determine the areal extent and depth of contamination by sampling at incremental depths on a sampling grid. The physical characteristics and chemical constituents and their concentrations will be determined for all known and discovered sources of contamination. The Respondents shall conduct sufficient sampling to define the boundaries of the contaminant sources to the level established in the QA/QC plan and DQOs.

Defining the source of contamination will include analyzing the potential for contaminant release (e.g., potential for long term release from soil), contaminant mobility and persistence, and characteristics important for evaluating remedial actions, including information to assess treatment technologies.

Define Human & Ecological Use of Site

Respondents will gather the information and data necessary to define use of the Site so that a Site-specific exposure assessment can be performed. In addition, future use of the Site shall be investigated. Specifically, Respondents shall identify planned or projected developments, and any other reasonably foreseeable future uses that may affect soil quality or human or ecological exposure to hazardous substances at or from site.

Describe the nature and extent of contamination

The Respondents will gather information to describe the nature and extent of contamination as a final step during the field investigation. To describe the nature and extent of contamination, the Respondents will utilize the information and site physical and biological characteristics and sources of contamination to give a preliminary estimate of the contaminants that may have migrated. The Respondents will then implement an iterative monitoring program and any study program identified in the work plan or SAP such that by using analytical techniques sufficient to detect and quantify the concentration of contaminants, the migration of contaminants through the various media at the Site can be determined. In addition, the Respondents will gather data for calculations of contaminant fate and transport. This process is continued until the area and depth of contamination are known to the level established in the QA/QC plan and DQOs. Respondents will use the information on the nature and extent of contamination in conjunction with the baseline risk assessments to determine the level of risk presented by the Site. Respondents will use this information to help to determine aspects of the appropriate remedial action alternatives to be evaluated.

c. Data Analyses

Evaluate site characteristics

The Respondents will analyze and evaluate the data to describe: (1) site physical and biological characteristics; (2) contaminant source characteristics; (3) nature and extent of contamination; and (4) contaminant fate and transport. Results of the site physical characteristics, source characteristics, and extent of contamination analyses are utilized in the analysis of contaminant fate and transport. The evaluation will include the actual and potential magnitude of releases from the sources, and horizontal and vertical spread of contamination as well as mobility and persistence of contaminants. Where modeling is appropriate, such models shall be identified to EPA in a technical memorandum prior to their use. The RI data shall be presented in a format (i.e., computer disc or equivalent) acceptable to EPA. The Respondents shall agree to discuss and then satisfy any data gaps identified by EPA that are needed to complete the baseline risk assessment (see "Guidance for Data Useability in Risk Assessment - OSWER Directive # 9285.7-05 - October 1990). Also, this evaluation shall provide any information relevant to site characteristics necessary for evaluation of the need for remedial action in the baseline risk assessment and for the development and evaluation of remedial alternatives. Data developed for site characterization will meet the DQOs developed in the QA/QC plan stated in the SAP (or as revised during the RI).

Assess Human & Ecological Risk

The baseline human health risk assessment and the ecological risk assessment (if required) will be conducted following the collection of chemical and biological information and data as determined by EPA. EPA will review (along with DEQ, ODHS, and ATSDR) the Respondents' qualifications to perform the risk assessments. EPA will determine Respondents' qualifications to perform the risk assessments in accordance with OSWER Directive No. 9835.15c. EPA reserves the right to perform the baseline risk assessments. Upon EPA approval, Respondents shall perform baseline risk assessments for human health and ecological impacts using guidance designated by EPA. This guidance may include but not be limited to: Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (Parts A and D); Interim Guidance: Developing Risk Based Clean-up Levels at Resource Conservation and Recovery Act Sites in Region 10, (January, 1998); Ecological Risk Assessment for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final, June 1997; and Guidelines for Ecological Risk Assessment, EPA/630/R95/002-F, 1998. Many of these guidance documents and others may be found at:

www.epa.gov/superfund/programs/risk/humhlth.htm
www.epa.gov/r10earth/offices/oea/risk/r0riskec.htm

Respondents will meet with EPA to scope the risk assessments. Following the scoping meeting, Respondents will prepare a risk assessment scoping memorandum for

EPA review and approval. The risk assessment scoping memorandum shall describe the scope of the human health and ecological risk assessments as agreed upon with EPA during the scoping meeting, describe the key elements of the human health and ecological risk assessments (e.g., exposure pathway and receptor identification) and provide a list of interim deliverables and a schedule for their submittal. It is anticipated that the conceptual site models, exposure assessments, and problem formulation that were completed during RI/FS scoping will be revised to reflect new information and data. Draft baseline human health and ecological risk assessment reports will be submitted to EPA for review and approval. The final risk assessment reports shall be included with the RI report.

d. Data Management Procedures

The Respondents will consistently document the quality and validity of field and laboratory data compiled during the RI.

Document field activities

Information gathered during site characterization will be consistently documented and adequately recorded by the Respondents in well-maintained field logs and laboratory reports. The method(s) of documentation must be specified in the work plan and/or the SAP. Field logs must be utilized to document observations, measurements, and important events that have occurred during field activities. Laboratory reports must document sample custody, analytical responsibility, analytical results, adherence to prescribed protocols, nonconformity events, corrective measures, and/or data deficiencies.

Maintain sample management and tracking

The Respondents will maintain field reports, sample shipment records, analytical results, and QA/QC reports to ensure that only validated analytical data are reported and utilized in the development and evaluation of remedial alternatives. Analytical results developed under the work plan will not be included in any site characterization reports unless accompanied by or cross-referenced to a corresponding QA/QC report. In addition, the Respondents will establish a data security system to safeguard chain-of-custody forms and other project records to prevent loss, damage, or alteration of project documentation.

e. Site Characterization Deliverables

The Respondents will prepare the preliminary site characterization summary, baseline risk assessment and the remedial investigation report.

Preliminary Site Characterization Summary

After review of existing Site data for the existing residential properties regarding asbestos contamination, the Respondents will first prepare a concise site characterization summary for asbestos. Once that task is completed and after completion of field sampling and analysis for other contaminants of concern, the Respondents will prepare a concise site characterization summary for the other contaminants of concern. Both summaries will review the investigative activities that have taken place, and describe and display site data documenting the location and characteristics of surface and subsurface features and contamination at the site, including the affected medium, location, types, physical state, concentration of contaminants and quantity. In addition, the location, dimensions, physical condition and varying concentrations of each contaminant throughout each source, and the extent of contaminant migration through each of the affected media will be documented. The site characterization summaries will provide EPA and the Respondents with a preliminary reference for developing the risk assessment, and evaluating the development and screening of remedial alternatives, and the refinement and identification of ARARs.

Remedial Investigation (RI) Report

The Respondents will prepare and submit a draft RI report to EPA for review and approval. This report shall summarize results of field activities to characterize the Site, sources of contamination, nature and extent of contamination, and the fate and transport of contaminants. The Respondents will refer to the RI/FS Guidance for an outline of the report format and contents. Following comment by EPA, the Respondents will prepare a final RI report which addresses EPA's comments to EPA's satisfaction.

Human Health & Ecological Risk Assessment Report

Once all interim deliverables have been completed, Respondents shall submit the baseline risk assessment report, consistent with EPA guidance and the requirements of this SOW.

TASK E. TREATABILITY STUDIES

If appropriate, treatability testing will be performed by the Respondents to assist in the detailed analysis of alternatives. In addition, if applicable, testing results and operating conditions will be used in the detailed design of the selected remedial technology. The following activities will be performed by the Respondents:

a. Determination of Candidate Technologies and of the Need for Testing

The Respondents will identify in a technical memorandum, subject to EPA review and approval, candidate technologies for a treatability studies program during project planning. The

listing of candidate technologies will cover the range of technologies required for alternatives analysis. The specific data requirements for the testing program will be determined and refined during site characterization and the development and screening of remedial alternatives.

Conduct literature survey and determine the need for treatability testing

The Respondents will conduct a literature survey to gather information of performance, relative costs, applicability, removal efficiencies, operation and maintenance (O&M) requirements, and implementability of candidate technologies. If practical candidate technologies have not been sufficiently demonstrated, or cannot be adequately evaluated for this Site on the basis of available information, treatability testing will be conducted. Where it is determined by EPA that treatability testing is required, and unless the Respondents can demonstrate to EPA's satisfaction that they are not needed, the Respondents will submit a statement of work to EPA outlining the steps and data necessary to evaluate and initiate the treatability testing program.

Evaluation of treatability studies

Once a decision has been made to perform treatability studies, the Respondents and EPA will decide on the type of treatability testing to use (e.g., bench versus pilot). Because of the time required to design, fabricate, and install pilot scale equipment as well as perform testing for various operating conditions, the decision to perform pilot testing should be made as early in the process as possible to minimize potential delays of the FS. To assure that a treatability testing program is completed on time, and with accurate results, the Respondents will either submit a separate treatability testing work plan or an amendment to the original Site work plan for EPA review and approval.

b. Treatability Testing and Deliverables

The deliverables that are required, in addition to the memorandum identifying candidate technologies, where treatability testing is conducted, include a work plan, a sampling and analysis plan, and a final treatability evaluation report. EPA may also require a treatability study health and safety plan, where appropriate.

Treatability testing work plan

The Respondents will prepare a treatability testing work plan or amendment to the original Site work plan for EPA review and approval describing the Site background, remedial technology(ies) to be tested, test objectives, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety, and residual waste management. The DQOs for treatability testing should be documented as well. If testing is to be performed off-site, permitting requirements will be addressed.

Treatability study SAP

If the original QAPP or FSP is not adequate for defining the activities to be performed during the treatability tests, a separate treatability study SAP or amendment to the original Site SAP will be prepared by the Respondents for EPA review and approval.

Treatability study health and safety plan

If the original health and safety plan is not adequate for defining the activities to be performed during the treatment tests, a separate or amended health and safety plan will be developed by the Respondents. EPA does not "approve" the treatability study health and safety plan.

Treatability study evaluation report

Following completion of treatability testing, the Respondents will analyze and interpret the testing results in a technical report to EPA. Depending on the sequence of activities, this report may be a part of the RI/FS report or a separate deliverable. The report will evaluate each technology's effectiveness, implementability, cost, and actual results as compared with predicted results. The report will also evaluate full scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation.

TASK F. DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

The development and screening of remedial alternatives is performed to develop an appropriate range of waste management options that will be evaluated. This range of alternatives should include, as appropriate, options in which treatment is used to reduce the toxicity, mobility, or volume of wastes, but varying in the types of treatment, the amount treated, and the manner in which long-term residuals or untreated wastes are managed; options involving containment with little or no treatment; options involving both treatment and containment; and a no-action alternative. The following activities will be performed by the Respondents as a function of the development and screening of remedial alternatives:

Refine and document remedial action objectives

Based on the baseline risk assessment, the Respondents will review and, if necessary, modify the site-specific remedial action objectives that were established by EPA prior to or during negotiations between EPA and the Respondents. The revised RAOs will be documented in a technical memorandum that will be reviewed and approved by EPA. These modified RAOs will specify the contaminants and media of interest, exposure pathways and receptors, and an acceptable contaminant level or range of levels (at particular locations for each exposure route).

Develop general response actions

The Respondents will develop general response actions for each medium of interest defining containment, treatment, excavation, or other actions, singly or in combination, to satisfy the remedial action objectives.

Identify areas or volumes of media

The Respondents will identify areas or volumes of media to which general response actions may apply, taking into account requirements for protectiveness as identified in the remedial action objectives. The chemical and physical characterization of the Site will also be taken into account.

Identify, screen, and document remedial technologies

The Respondents will identify and evaluate technologies applicable to each general response action to eliminate those that cannot be implemented at the Site. General response actions will be refined to specify remedial technology types. Technology process options for each of the technology types will be identified either concurrent with the identification of technology types, or following the screening of the considered technology types. Process options will be evaluated on the basis of effectiveness, implementability, and cost factors to select and retain one or, if necessary, more representative processes for each technology type. The technology types and process options will be summarized for inclusion in a technical memorandum. The reasons for eliminating alternatives must be specified.

Assemble and document alternatives

The Respondents will assemble selected representative technologies into alternatives for each affected medium or operable unit. Together, all of the alternatives will represent a range of treatment and containment combinations that will address either the Site or the operable unit as a whole. A summary of the assembled alternatives and their related action-specific ARARs will be prepared by the Respondents for inclusion in a technical memorandum. The reasons for eliminating alternatives during the preliminary screening process must be specified.

Refine alternatives

The Respondents will refine the remedial alternatives to identify contaminant volume addressed by the proposed process and sizing of critical unit operations as necessary. Sufficient information will be collected for an adequate comparison of alternatives. RAOs will also be modified as necessary to incorporate any new risk assessment information presented in the baseline risk assessment report. Additionally, action-specific ARARs will be updated as the remedial alternatives are refined.

Conduct and document screening evaluation of each alternative

The Respondents may perform a final screening process based on short- and long-term aspects of effectiveness, implementability, and relative cost. Generally, this screening process is only necessary when there are many feasible alternatives available for detailed analysis. If necessary, the screening of alternatives will be conducted to assure that only the alternatives with the most favorable composite evaluation of all factors are retained for further analysis. As appropriate, the screening will preserve the range of treatment and containment alternatives that was initially developed. The range of remaining alternatives will include options that use treatment technologies and permanent solutions to the maximum extent practicable. The Respondents will prepare a technical memorandum summarizing the results and reasoning employed in screening, arraying alternatives that remain after screening, and identifying the action-specific ARARs for the alternatives that remain after screening.

The Respondents will prepare a technical memorandum summarizing the work performed in and the results of each task above, including an alternatives array summary. These will be modified by the Respondents if required in EPA's comments to assure identification of a complete and appropriate range of viable alternatives to be considered in the detailed analysis. This deliverable will document the methods, rationale, and results of the alternatives screening process.

TASK G. DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

The detailed analysis will be conducted by the Respondents to provide EPA with the information needed to allow for the selection of the Site remedy. This analysis is the final task to be performed by the Respondents during the FS.

a. Detailed Analysis of Alternatives

The Respondents will conduct a detailed analysis of alternatives which will consist of an analysis of each option against a set of nine evaluation criteria and a comparative analysis of all options using the same evaluation criteria as a basis for comparison.

Apply nine criteria and document analysis

The Respondents will apply nine evaluation criteria to the assembled remedial alternatives to ensure that the selected remedial alternative will be protective of human health and the environment; will be in compliance with, or include a waiver of, ARARs; will be cost-effective; will utilize permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable; and will address the statutory preference for treatment as a principal element. The evaluation criteria include: (1) overall protection of human health and the environment; (2)

compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume; (5) short-term effectiveness; (6) implementability; (7) costs; (8) state (or support agency) acceptance; and (9) community acceptance. (Note: Criteria 8 and 9 are considered after the RI/FS report has been released to the general public.) For each alternative, the Respondents should provide: (1) a description of the alternative that outlines the waste management strategy involved and identifies the key ARARs associated with each alternative; and (2) a discussion of the individual criterion assessment. If the Respondents do not have direct input on Criteria 8 state (or support agency) acceptance and (9) community acceptance, these will be addressed by EPA.

Compare alternatives against each other and document the comparison of alternatives

The Respondents will perform a comparative analysis between the remedial alternatives. That is, each alternative will be compared against the others using the evaluation criteria as a basis of comparison. Identification of and selection of the preferred alternative is reserved by EPA. The Respondents will prepare a technical memorandum summarizing the results of the comparative analysis.

b. Feasibility Study Report

In addition to the technical memorandum summarizing the results of the comparative analysis, the Respondents will prepare and submit a draft Feasibility Study (FS) report to EPA. Once EPA's comments have been addressed by the Respondents to EPA's satisfaction, the final FS report may be bound with the final RI report.

The Respondents will prepare the draft FS report for EPA review and comment. This report, as ultimately adopted or amended by EPA, provides a basis for remedy selection by EPA and documents the development and analysis of remedial alternatives. The Respondents will refer to the RI/FS Guidance for an outline of the report format and the required report content. The Respondents will prepare a final FS report which addresses EPA's comments to EPA’s satisfaction.

REFERENCES FOR CITATION

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RI/FS process:

The (revised) National Oil and Hazardous Substance Pollution Contingency Plan (NCP).

"Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 9355.3-01.

"Interim Guidance on Potentially Responsible Party Participation in Remedial investigation and Feasibility Studies", U.S. EPA, Office of Waste Programs Enforcement, Appendix A to OSWER Directive No. 9355.3-01.

"Guidance on Oversight of Potentially Responsible Party Remedial Investigations and Feasibility Studies", U.S. EPA, Office of Waste Programs Enforcement, OSWER Directive No. 9835.3.

"A Compendium of Superfund Field Operations Methods", Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, EPA/540/P-87/001a, August 1987, OSWER Directive No. 9355.0-14.

"EPA NEIC Policies and Procedures Manual", May 1978, revised November 1984, EPA-330/9-78-991-R.

"Data Quality Objectives for Remedial Response Activities", U.S. EPA, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, EPA/540/G-87/003, March 1987, OSWER Directive No. 9335.0-7B.

"Guidelines and Specifications for Preparing Quality Assurance Project Plans", U.S. EPA, Office of Research and Development,, Cincinnati, Ohio, QAMS-004/80, December 29, 1980.

"Interim Guidelines and Specifications for preparing Quality Assurance Project Plans", U.S. EPA, Office of Emergency and Remedial Response, QAMS-005/80, December 1980.

"Users Guide to the EPA Contract Laboratory Program:, U.S. EPA, Sample Management Office, August 1982.

"Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements", U.S. EPA, Office of Emergency and Remedial Response, July 9, 1987, OSWER Directive No. 9234.0-05.

"CERCLA Compliance with Other Laws Manual", Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, August 1988 (draft), OSWER Directive No. 9234.1-01 and -02.

"Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites", U.S. EPA, Office of Emergency and Remedial Response, (draft), OSWER Directive No. 9283.1-2.

"Draft Guidance on Preparing Superfund Decision Documents", U.S. EPA, Office of Emergency and Remedial Response, March 1988, OSWER Directive No. 9355.3-02.

"Risk Assessment Guidance for Superfund--Volume I, Human Health Evaluation Manual (Part A)", December 1989, EPA/540/1-89/002.

"Risk Assessment Guidance for Superfund--Volume II Environmental Evaluation Manual", March 1989, EPA/540/1-89/001.

"Guidance for Data Usability in Risk Assessment", October 1990, EPA/540/G-90/008.

"Performance of Risk Assessments in Remedial Investigation/ Feasibility Studies (RI/FSs) Conducted by Potentially Responsible Parties (PRPs)", August 28, 1990, OSWER Directive No. 9835.15.

"Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions", April 22, 1991, OSWER Directive No. 9355.0-30.

"Health and Safety Requirements of Employees Employed in Field Activities", U.S. EPA, Office of Emergency and Remedial Response, July 12, 1981, EPA Order No. 1440.2.

OSHA Regulations in 29 CFR 1910.120 (Federal Register 45654, December 19, 1986).

"Interim guidance on Administrative Records for Selection of CERCLA Response Actions", U.S. EPA, Office of Waste Programs Enforcement, March 1, 19889, OSWER Directive No. 9833.3A.

"Community Relations in Superfund: A Handbook", U.S. EPA, Office of Emergency and Remedial Response, June 1988, OSWER Directive No. 9320.0-03B.

"Community Relations During Enforcement Activities and Development of the Administrative Record", U.S. EPA, Office of Waste Programs Enforcement, November 1988, OSWER Directive No. 9836.0-1A.

“Superfund Community Involvement Handbook”, April 2002, EPA 540-K-01-003.
“Superfund Community Involvement Toolkit”, September 2002, EPA 540-K-01-004.

"Public Involvement Policy of the U.S. Environmental Protection Agency", May 2003, EPA 233-B-03-002.

"Risk Assessment Guidance for Superfund: Volume 1, Supplement to part A: Community Involvement in Superfund Risk Assessment", March 1999, EPA 540-R-98-042.